

present invention has been presented for purposes of illustration and description, but is not intended to be exhaustive, or limited to the invention in the form disclosed. The present invention should not be considered limited to the particular embodiments described above, but rather should be understood to cover all aspects of the invention as fairly set out in the attached claims. Various modifications, equivalent processes, as well as numerous structures to which the present invention may be applicable, will be readily apparent to those skilled in the art to which the present invention is directed upon review of the present disclosure.

[0544] All publications, standards, patents, and patent applications cited in this specification are incorporated herein by reference as if each individual publication, patent, or patent application were specifically and individually indicated to be incorporated by reference and set forth in its entirety herein.

1. A method for use with a frame-based wired network that carry a waveform of part of a frame over medium that comprises two conductors, for use with multiple devices that are connected to, and communicate with each other over, the medium, and for use with a first memory that stores multiple waveform-related criteria, each of the criteria is associated with at least one of the multiple devices, the method comprising:

receiving, via a connector connectable to the medium, a waveform that is transmitted to the medium by one of the multiple devices;

producing, by an Analog-to-Digital (A/D) converter that is coupled to the connector, digital samples of the received waveform;

storing, in a second memory that is coupled to the A/D converter, the digital samples;

comparing, using a software that is executed by a processor, the digital samples to the multiple waveform-related criteria in the first memory;

determining, by the software executed by the processor, whether the digital samples satisfy at least one of the waveform-related criteria; and

transmitting an error signal in response to determining that the digital samples do not satisfy any of the waveform-related criteria,

wherein the connector, the A/D converter, the first and second memories, and the processor, are housed in a single enclosure.

2. The method according to claim 1, wherein at least one criterion out of the multiple criteria is determined as not satisfied in response to changing of, or connecting to, the medium.

3. The method according to claim 2, wherein at least one criterion out of the multiple criteria is determined as not satisfied in response to connecting an additional device to the medium.

4. The method according to claim 3, wherein the additional device is configured to communicate with at least one of the multiple devices when connected to the medium.

5. The method according to claim 1, wherein at least one criterion out of the multiple criteria is determined as not satisfied in response to a change in a device from the multiple devices that is associated with the respective criterion.

6. The method according to claim 1, further comprising, by a transceiver coupled between the connector and the processor, transmitting frames to, and receiving frames from, one or more of the multiple devices over the medium, and wherein the digital samples are formed from sampling of a signal carried differentially over the two conductors, or from samples of a signal carried between one of the two conductors and the ground.

7. The method according to claim 6, further comprising a controller for layer 2 or layer 3 handling of the received frame, and wherein the transmitting comprises transmitting to the controller.

8. The method according to claim 7, wherein each one of the multiple devices is associated with a digital address for uniquely identifying each of the multiple devices in the wired network, and wherein the method further comprising identifying the digital address of the device that transmitted the waveform.

9. The method according to claim 8, wherein the digital address is extracted from the received frame.

10. The method according to claim 9, wherein the comparing comprises comparing the digital samples to the waveform-related criterion that is associated with, is based on, or is according to, the identified digital address.

11. The method according to claim 1, wherein the received waveform frequency spectrum is limited by a maximum component frequency, and wherein the sampling rate of the producing by the A/D converter is higher than twice the maximum component frequency.

12. The method according to claim 1, further comprising at least partially terminating a signal propagating over the medium by an impedance or a resistor connected to the connector.

13. The method according to claim 1, further configured to detect a malware or a malware activity, wherein the malware consists of, includes, or is based on, a computer virus, spyware, DoS (Denial of Service), rootkit, ransomware, adware, backdoor, Trojan horse, or a destructive malware.

14. The method according to claim 1, wherein the comparing comprises measuring a value of a parameter or a characteristic using time-domain or frequency domain analyzing of the digital samples.

15. The method according to claim 1, wherein the comparing comprises frequency-domain analyzing of the digital samples for measuring a value of a parameter or a characteristic.

16. The method according to claim 1, wherein the comparing comprises analyzing or classifying the waveform using an Artificial Neural Network (ANN).

17. The method according to claim 16, wherein the ANN is a Feedforward Neural Network (FNN).

18. The method according to claim 16, wherein the ANN is a Recurrent Neural Network (RNN) or a deep convolutional neural network.

19. The method according to claim 1, further comprising notifying a human user using auditory, visual, or haptic stimuli using an annunciator coupled to the processor, in response to determining that the digital samples do not satisfy any of the waveform-related criteria.

20. The method according to claim 1, further comprising transmitting to the medium using a line driver or a transceiver in response to determining that the digital samples do not satisfy any of the waveform-related criteria.